Remarks/Arguments

Claims 2-5 have been amended properly refer back to the RF circuit of claim 1. Claim 6 has been amended for clarity. Claims 10-12 have been added. Newly-added claim 10 is supported on page 3, lines 3-16 of the original specification. Newly-added claims 11-12 are supported by least figure 2 of the application as originally filed. No new matter has been added.

35 U.S.C. §103

Claims 1-9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Loke (U.S. Patent No. 6,311,048), in view of Fajen et al. (U.S. Patent No. 5,517,688), herein after "Fajen".

It is respectfully asserted that neither Loke nor Fajen, alone or in combination, discloses an RF-circuit including an amplifier and a controllable mixer where:

> "a controllable portion of the overall gain of the RF circuit is determined by the operating point of the at least one mixing transistor,"

as described in claim 1.

Among the problems addressed by the present invention are the need to suppress signals which are adjacent to a useful signal and the high degree of complexity of the circuitry required for this purpose. (Specification, page 2) To address these problems, the present application describes an RF-circuit including an amplifier and a controllable mixer, wherein a control signal is applied to a mixing transistor as a function of the signal quality of the demodulated output signal so as to set the operating point of the mixing. The intermodulation immunity and/or noise in the output signal can be varied, and a controllable portion of the overall gain of the RF-circuit is determined, as a function of the operating point of the mixing transistor.

The present invention, as recited in claim 1, describes an RF-circuit including an amplifier and a controllable mixer, the controllable mixer having at least one mixing transistor, to which mixing transistor an oscillator signal and an input signal are supplied, wherein the input signal comprises a useful signal and further signals, and wherein an output signal is produced as an output of the mixer, wherein a controller is provided, which applies a control signal to the-mixing transistor as a function of the signal quality of the demodulated output signal, wherein the operating point of the at least one mixing transistor can be set by means of the control signal, in which case the intermodulation immunity and/or the noise in the output signal can be varied as a function of the operating point of the at least one transistor, wherein *a controllable portion of the overall gain of the RF-circuit is determined by the operating point of the at least one mixing transistor.*

In contrast, Loke teaches "a method and system for intelligently controlling the linearity of an RF receiver by selectively increasing the effective third-order intercept point (IP3) value of a low noise amplifier (LNA)/mixer channel only when needed. A control signal is generated based on mode of operation (receive mode); received signal strength information (RSSI); transmit channel output power, as indicated by a Tx automatic gain control (AGC) signal; and the true received signal strength, as indicated by the pilot signal-to-noise ratio in a CDMA system. The control signal is then used to selectively increase the bias current—and thus linearity—of the LNA/mixer channel, or to select one of several LNAs having differing IP3 values to effectively increase the linearity of the LNA/mixer channel." (Loke Abstract)

Loke specifically addresses the problem of strong signals that are caused by the CDMA transmitter in the apparatus itself. In this case, the CDMA code of the transmitter corresponds to the code of the receiver, and interference can occur. In order to avoid intermodulation in the receiver, Loke discloses selection of a high IP3 LNA, or an increase in the bias to the LNA/mixer channel, whenever the transmit power of the transmitter in the device is high (see column 4, lines 1-5). Loke discloses a test with two interference tones at a predetermined input level, which may cause in-band spurious frequencies. (Loke, column 4, lines 13-27) Due to the relatively high level of the test signal, the gain of the circuit is considered unimportant. If a signal not exceeding a predetermined value is received, Loke

selects a low IP3 LNA or decreases the LNA/mixer bias current (see column 4, lines 18 – 23). Otherwise, the LNA is bypassed or an attenuator is switched in before the LNA/mixer channel. The system of Loke does not need to evaluate the received signal in order to know when to select a high IP3 value because the circuit knows when it is transmitting.

Applicant respectfully disagrees with Examiner that Loke discloses, in column 2 lines 10-15, setting the operating point of the at least one mixing transistor by means of the control signal indicative of the quality of the demodulated output signal. Rather, Loke generally discloses selectively increasing the bias current – and thus linearity – of the LNA/mixer channel, or selection of one of several LNAs having different IP3 values to effectively increase the linearity of the LNA/mixer channel.

Furthermore, Loke does not draw a distinction between mixer and LNA, consistently addressing both elements as a single '*LNA/mixer channel*' unit. (Figure 1 shows that a single common bias signal is applied to receiver 106) As such, a person of ordinary skill in the art would not know which part of the LNA/mixer channel actually receives the bias current, and which effect is caused by which element when the bias current is changed. Loke also does not discuss gain in the mixer or the mixing transistor. Therefore, person of ordinary skill in the art would also attribute any gain, and control thereof, to the LNA rather than to the mixer. Consequently, the disclosure of Loke fails to clearly disclose the feature of setting the operating point of the at least one mixing transistor by means of the control signal. Thus, Loke fails to disclose an RF-circuit including an amplifier and a controllable mixer where: "a controllable portion of the overall gain of the RF circuit is determined by the operating point of the at least one mixing transistor," as described claim 1.

Fajen teaches "a MMIC FET mixer and method includes a RF input port for receiving a RF signal, a feedback control input for receiving a feedback signal, and a LO input port for receiving a LO signal. A feedback controller is coupled to the RF amplifier, the feedback controller for producing a controlled RF signal in response to the feedback signal. A constant current source is coupled to the feedback controller, to the RF amplifier and to the LO input port. The constant current source receives a DC offset voltage, the

controlled RF signal, and the LO signal and produces an IF output signal at an IF output port. The IF output signal is proportional to the DC offset voltage, to the RF signal, and to the LO signal." (Fajen Abstract) In Fajen, the output signal of the circuit can be used in a negative feedback manner to increase the third-order intercept point performance (see column 2, lines 23-26 of Fajen).

While Fajen discloses the use of transistors in a mixer, Applicant respectfully disagrees with Examiner that the negative feedback disclosed in Fajen can be used for setting the operating point of a transistor. Rather, negative feedback is applied to the signal input in opposite phase to the input signal for reducing the level of the input signal. The operating point of a transistor is not changed through application of negative feedback. Typically, the operating point of a transistor is set to be fixed compared to the frequency of a signal that is to be amplified or mixed in the transistor. If the operating point is changed at all, it is changed at a rate or frequency much lower than the frequency of a useful signal passed via the transistor.

Changing the collector current in the mixer is known for changing the IP3 immunity. (See, e.g., figure 5 of the present application) Using the effect of changes of the operating point of the mixing transistor for changing a portion of the overall gain of the circuit, however, is not disclosed in the prior art, and is also not obvious to the person of ordinary skill in the art when facing the disclosures of Loke or Fajen. Applying the disclosure of Fajen to the disclosure of Loke still fails to disclose, teach, or suggest that a controllable portion of the overall gain of the RF circuit is determined by the operating point of the at least one mixing transistor. Fajen, like Loke, fails to disclose an RF-circuit including an amplifier and a controllable mixer where: "a controllable portion of the overall gain of the RF circuit is determined by the operating point of the at least one mixing transistor," as described claim 1.

In view of the above remarks and amendments, it is respectfully submitted that there is no 35 USC 112 enabling disclosure provided by neither Loke nor Fajen, alone or in combination, which makes the present invention as claimed in claim 1 unpatentable. It is

further submitted that currently amended independent claim 6 is allowable for at least the same reasons that claim 1 is allowable. Since dependent claims 2-5 and 7-12 are dependent from allowable independent claims 1 and 6, it is submitted that they too are allowable for at least the same reasons that their respective independent claims are allowable. Thus, it is further submitted that this rejection has been satisfied and should be withdrawn.

Having fully addressed the Examiner's rejections it is believed that, in view of the preceding amendments and remarks, this application stands in condition for allowance. Accordingly then, reconsideration and allowance are respectfully solicited. If, however, the Examiner is of the opinion that such action cannot be taken, the Examiner is invited to contact the applicant's representative at (609) 734-6804, so that a mutually convenient date and time for a telephonic interview may be scheduled.

No fee is believed due. However, if a fee is due, please charge the additional fee to Deposit Account 07-0832.

Respectfully submitted,

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